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ANN ARBOR, MI 48104				
EXAMINER				
MEHRABIAN, SEVAN				
ART UNIT		PAPER NUMBER		
3746				
NOTIFICATION DATE		DELIVERY MODE		
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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# Office Action Summary

**Application No.**

10/510,417

**Applicant(s)**

KITAHARA ET AL.

**Examiner**

SEVAN MEHRABIAN

**Art Unit**

3746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 06/25/2007.  
2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.  
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-14 is/are pending in the application.  
4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
6) ☒ Claim(s) 1-14 is/are rejected.  
7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.  
8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
10) ☒ The drawing(s) filed on 06 October 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)  
2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)  
3) ☒ Information Disclosure Statement(s) (PTO/SI/100)  
Paper No(s)/Mail Date 06/25/2007 & 10/06/2004  
4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_  
5) ☐ Notice of Informal Patent Application  
6) ☐ Other: \_\_\_\_\_

### DETAILED ACTION

1. The following is a non-final, first office action on the merits in response to the preliminary amendment received October 6, 2004. Claims 3, 4, 7, 9, 10 and 14 have been amended. Therefore, claims 1-14 are pending and addressed below.

#### ***Claim Rejections - 35 USC § 112***

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 5 and 6 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. Referring to claim 5 the applicant claims: "the suction port arranged at the top portion of the cylinder with a suction valve, which opens when the volume of the pump chamber is increased; and the exhaust port arranged at the piston with an exhaust valve, which opens when the volume of the pump chamber is decreased", which is on the contrary to the applicant's first claim and the specifications where the applicant discloses, "a suction port arranged at a top of the piston which a suction valve" and "an exhaust port arranged at a top of the cylinder with an exhaust valve". The examiner acknowledges that independent claims 1 and 5 are reverse of one another referring to the positioning of suction and exhaust ports on the cylinder and the piston, however, the examiner did not make an assumption to further understand

the invention. Both claims are rejected below using different prior art, addressing limitations of each claim as discussed above.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-4, 7 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 5,188,519 to Spulgis (Spulgis) in view of Japanese Patent No. 2001012354A to Hiroshi Ogawa (Ogawa).

In Reference to Claim 1

Spulgis teaches a piston pump (10) comprising: a cylindrical cylinder (12); a piston (14) reciprocating inside the cylinder; a suction port (See Fig. 1, top of

piston) through which gas sucked into a pump chamber defined by the cylinder (12) and the piston (14) passes; and an exhaust port (52) through which the gas discharged from the pump chamber (20) passes; wherein the piston pump sucks the gas through the suction port and discharges the gas through the exhaust port (52) as the volume of the pump chamber is changed by reciprocating motion of the piston; wherein the suction port is arranged at a top of the piston with a suction valve (24), which opens as the volume of the pump chamber is increased; and wherein the exhaust port (52) is arranged at a top of the cylinder with an exhaust valve (60), which opens when the volume of the pump chamber decreases. However, Spulgis (saturated fluid pump) fails to gas as the material being compressed and pumped by the pump apparatus which is taught by Ogawa.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the Spulgis apparatus by means of Ogawa to achieve improvement in the cooling efficiency of the piston chamber, hence, extending the life of the piston.

#### In Reference to Claim 2

Spulgis and Ogawa teach the piston pump according to claim 1 (see claim 1 rejection above), and Spulgis further teaches wherein the suction valve (24) is arranged on a side of the pump chamber (see Fig. 2).

#### In Reference to Claim 3

Spulgis and Ogawa teach the piston pump according to claim 1 (see claim 1 rejection above), and Spulgis further teaches wherein the exhaust valve (52) is arranged on an opposite side to the pump chamber of the top of the cylinder (12).

In Reference to Claim 4

Spulgis and Ogawa teach the piston pump according to claim 1 (see claim 1 rejection above), and Spulgis further teaches wherein the piston (14) has an opening (See Fig. 1) communicating with the suction port on an opposite side to the pump chamber, wherein the opening is arranged so as to allow air sucked through the suction port into the pump chamber to pass and a plenum (56) capable of storing the air to communicate with the opening; and wherein the plenum (56) is encompassed by an enclosure having at least one plenum suction port (52).

Please note, that the phrase "an opposite side" in this claim is a relative term since it is not clear what it is meant by "an opposite side to the pump chamber" when the suction port is placed within the pump chamber. Therefore, the prior art anticipates this claim.

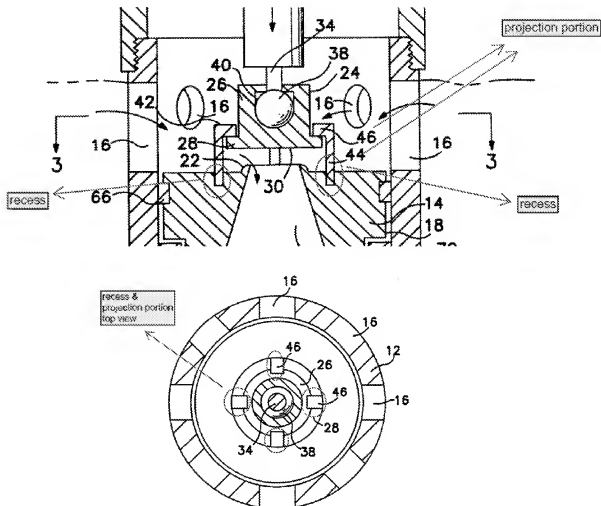
In Reference to Claim 7

Spulgis and Ogawa teach the piston pump according to claim 1 (see claim 1 rejection above), and Spulgis further teaches wherein the piston (14) engages with a coupling member (28+38+34+40) in such a manner that the coupling member is capable of turning in a circumferential direction thereof (Column 2, lines 39-45), and wherein the coupling member is connected to a connecting

member (32) driven such that the engaged piston (14) is reciprocated inside the cylinder (Column 3, lines 42-58, Claim 4 and Claim 5).

In Reference to Claim 8

Spulgis and Ogawa teach the piston pump according to claim 7 (see claim 7 rejection above), and Spulgis further teaches wherein the piston (14) comprises therein a recess portion (see Fig. below) formed in the circumferential direction of the piston (See Fig. 3) and engaged with the coupling member (26), wherein the coupling member (26) has a projection portion (44, 46) (Fig. 3) in the circumferential direction such that the projection portion (44) corresponds to the recess portion (Fig. 3), wherein the piston reciprocates when the projection portion (44, 46) and the recess portion engage with each other so as to transmit driving force from the connecting member (32) to the piston (14). However, Spuglis fails to teach the recess portion being formed continuously in the circumferential direction of the piston (See Fig. 3, 46), as well as the projection portion (44, 46) being formed continuously in the circumferential direction corresponding to the recess portion. It would have been obvious to one of ordinary skill in the art at the time of the invention to make the recess and the projection portion continuous, instead of four recesses/projection portions formed separately in a circumferential direction (see Fig. 3) as disclosed by Spulgis, to achieve simplicity in design and manufacturing by having both the recess and the projection portions continuous in a circumferential direction.



7. Claims 5 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 5,593,288 to Kikutani (Kikutani) in view of Ogawa.

In Reference to Claim 5

Kikutani teaches a piston pump including a cylindrical cylinder (21) having a top portion; a piston (22) reciprocating inside the cylinder (21); a suction port (34) through which gas sucked into a pump chamber (40) defined on a side of the top portion of the cylinder (21) by the cylinder (21) and the piston (22) passes; and an exhaust port (52) through which the gas discharged from the pump



chamber passes; wherein the piston pump sucks the gas from the suction port and discharges the gas through the exhaust port (52) as a volume of the pump chamber is changed by reciprocating motion of the piston (22); wherein the suction port is arranged at the top portion of the cylinder (21) with a suction valve (36), which opens when the volume of the pump chamber is increased; and the exhaust port (52) is arranged at the piston (22) with an exhaust valve (53), which opens when the volume of the pump chamber is decreased. (See Abstract). However, Kikutani fails to teach gas as the element to be compressed in the pump which is taught by Ogawa.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the Kikutani apparatus by means of Ogawa to achieve improvement in the cooling efficiency of the piston chamber, hence, extending the life of the piston.

In Reference to Claim 6

Kikutani and Ogawa teach the piston pump according to claim 5 (see claim 5 rejection above), wherein the suction valve (36) is arranged on a side of the pump chamber (40). (See Fig. 2)

8. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Spulgis.

In Reference to Claim 12

Spulgis teaches a piston pump in which a piston reciprocates inside a cylinder having a cylinder head for pressurization; the piston pump is characterized in that: (4) the cylinder and the cylinder head are non-mechanically

coupled. However, Spulgis fails to teach the other three characterizations mentioned in this claim. However, the applicant does not state a clear reason or motivation for the three ranges specified in this claim, therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make a piston pump with an inner diameter of the cylinder not exceeding 20 mm; a throughput of the piston pump not exceeding approximately 6.0 liters/min; and pressurization characteristics thereof maintained even after approximately 10,000 reciprocating motion of the piston; since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *in re Aller*, 105 USPQ 233.

9. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Spulgis and Ogawa in view of US Patent No. 3,931,755 to Hatridge (Hatridge).

In Reference to Claim 9

Spulgis and Ogawa teach the piston pump according to claim 1 (see claim 1 rejection above) but fail to teach wherein at least a portion of the piston sliding on an inner wall of the cylinder is composed of a self-lubricating material which is taught by Hatridge (Column 4, lines 63-66).

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the piston pump apparatus of Spulgis/Ogawa by the self-lubricating piston means of Hatridge to achieve resistance to corrosion with no expansion under heat, lesser wear of the piston and resistance to abrasion.

10. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Spulgis and Ogawa in view of US Patent No. 6,168,393 to Huber et al. (Huber).

In Reference to Claim 10

Spulgis and Ogawa teach the piston pump according to claim 1 (see claim 1 rejection above) and Spulgis further teaches wherein the cylinder comprises a top plenum (56) defined by a top enclosure (50) fixed to the top portion of the cylinder (12), but fail to teach the following limitation which is taught by Huber: a motor housing (7) fixed at a position spaced apart by a predetermined distance from the top portion such that the cylinder (6) is connected and fixed to at least a part of the motor housing (7) (see Abstract) wherein the motor housing (7) is composed of a base portion (Column 3, lines 42-49) fixed to the cylinder (6) and a cover portion disposed along the base portion such that the cover portion fastens the motor by sandwiching the motor with the base portion (see Fig. 1 and Column 4, lines 10-19); and wherein the cover portion and the base portion are engaged with a connecting mechanism capable of engagement and disengagement (Column 4, lines 29-33).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the piston pump apparatus disclosed by Spulgis/Ogawa in the piston pump assembly taught by Huber, which includes a motor, as well as housing for the motor and sealing means to achieve a simple, efficient and compact construction and also simple maintenance (Column 1, lines 20-22, lines 55-58)

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11. Claims 11 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Spulgis and Ogawa in view of US Patent No. 4,343,314 to Sramek (Sramek).

In Reference to Claims 11 and 14

Spulgis and Ogawa teach the piston pump according to claim 1 (see claim 1 rejection above) but fail to teach the following which is taught by Sramek: wherein the piston pump is connected to a blood pressure monitor (see Fig. 1 and Claim 2).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the piston pump apparatus of Spulgis/Ogawa in the blood pressure monitoring system of Sramek to achieve a blood pressure detecting system with a better precision (the measurements reflect the instantaneous blood pressure, column 2, line 5), and autonomous pumping means by having a motor based pump system.

12. Claim 13 is rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent No. 6,082,244 to Sigel et al.(Sigel) in view of US Patent No. 5,848,879 to Hansson (Hansson).

In Reference to Claim 13

Sigel teaches a method of producing a piston pump (10) including a cylindrical cylinder (14), a piston (20) reciprocating inside the cylinder; a suction port (38) through which gas sucked into a pump chamber defined by the cylinder and the piston passes and an exhaust port (64) through which the gas discharged from the pump chamber passes; the method comprising the steps of:

producing a piston pump pre-assembly comprising the cylinder and a cylinder top portion in which the exhaust port is formed; (Column 5, lines 5-18) producing a piston pump by further assembling components to the piston pump pre-assembly (Column 5, lines 5-12). However, Sigel fails to teach conducting a leakage inspection of the piston pump pre-assembly which is taught by Hansson (Column 3, lines 47-56).

It would have been obvious to one of ordinary skill in the art at the time of the invention to incorporate the method of inspecting fluid leakage from the piston apparatus disclosed by Hansson in the piston producing method of Sigel to achieve a more reliable and leakage free system by doing a prior inspection of the piston to identify and eliminate leakage.

### ***Conclusion***

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to SEVAN MEHRABIAN whose telephone number is (571)270-5058. The examiner can normally be reached on Monday through Friday, 9:30 AM to 7:00 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Devon Kramer can be reached on (571) 272-7118. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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14. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Devon C Kramer/  
Supervisory Patent Examiner, Art  
Unit 3683

SM